a trench that extends from the first main surface of the semiconductor substrate to the drift region through the emitter region and the base region;

an insulating film that is provided along an inner wall of the trench;

a gate electrode that is embedded in the trench through the insulating film;

an emitter electrode that comes into contact with the emitter region and the base region;

a shell region of the first conductivity type that is provided in the drift region so as to come into contact with a surface of the base region close to the drift region; and

a collector region of the second conductivity type that is provided in a surface layer of a second main surface of the semiconductor substrate, wherein:

the shell region has a higher impurity concentration than the drift region,

an effective dose of a first-conductivity-type impurity in the shell region is equal to or less than 5.0×10^{12} cm^{-2}, and

the drift region has a resistivity to prevent a depletion layer, which is spread from the collector region when a reverse rated voltage with the emitter electrode as a positive electrode is applied, from reaching either the shell region or the bottom of the trench, whichever is closer to the collector region than the other.

2. The semiconductor device according to claim **1**, wherein the effective dose of the first-conductivity-type impurity in the shell region is equal to or less than 4.0×10^{12} cm^{-2}.

3. The semiconductor device according to claim **1**, wherein a first-conductivity-type region that has a higher impurity concentration than the drift region is provided between the drift region and the collector region to reduce a leakage current.

4. The semiconductor device according to claim **1**, further comprising an isolation region of the second conductivity type that is provided in an outer circumferential end portion of the drift region and extends from the first main surface of the semiconductor substrate to the collector region.

5. The semiconductor device according to claim **1**, wherein the drift region has a resistivity to prevent the depletion layer, which is spread from the collector region to the base region when the reverse rated voltage is applied with the emitter electrode as the positive electrode, from reaching either the base region or the bottom of the trench, whichever is closer to the collector region than the other.

6. A semiconductor device comprising:

a drift region that is a semiconductor substrate of a first conductivity type;

a first base region of a second conductivity type that is selectively provided in a surface layer of a first main surface of the semiconductor substrate;

a first emitter region of the first conductivity type that is selectively provided in the first base region;

a first trench that extends from the first main surface of the semiconductor substrate to the drift region through the first emitter region and the first base region;

a first insulating film that is provided along an inner wall of the first trench;

a first gate electrode that is embedded in the first trench through the first insulating film;

an emitter electrode that comes into contact with the first emitter region and the first base region;

a first shell region of the first conductivity type that is provided in the drift region so as to come into contact with a surface of the first base region close to the drift region;

a second base region of the second conductivity type that is selectively provided in a surface layer of a second main surface of the semiconductor substrate;

a second emitter region of the first conductivity type that is selectively provided in the second base region;

a second trench that extends from the second main surface of the semiconductor substrate to the drift region through the second emitter region and the second base region;

a second insulating film that is provided along an inner wall of the second trench;

a second gate electrode that is embedded in the second trench through the second insulating film;

a rear surface electrode that comes into contact with the second emitter region and the second base region; and

a second shell region of the first conductivity type that is provided in the drift region so as to come into contact with a surface of the second base region close to the drift region, wherein:

the first shell region and the second shell region have a higher impurity concentration than the drift region,

an effective dose of a first-conductivity-type impurity in the first shell region and the second shell region is equal to or less than 5.0×10^{12} cm^{-2}, and the drift region has a resistivity to prevent a depletion layer, which is spread from the second base region when a reverse rated voltage is applied with the emitter electrode as a positive electrode, from reaching either the first shell region or the bottom of the first trench, whichever is closer to the second shell region than the other.

7. The semiconductor device according to claim **6**, wherein the effective dose of the first-conductivity-type impurity in the second shell region is equal to or less than 4.0×10^{12} cm^{-2}.

8. The semiconductor device according to claim **6**, wherein the drift region has a resistivity to prevent the depletion layer, which is spread from the second base region to the first base region when the reverse rated voltage is applied with the emitter electrode as the positive electrode, from reaching either the first base region or the bottom of the first trench, whichever is closer to the second shell region than the other.

9. A semiconductor device comprising:

a first semiconductor region that is a semiconductor substrate of a first conductivity type;

a second semiconductor region of a second conductivity type that is selectively provided in a surface layer of a first main surface of the semiconductor substrate;

a third semiconductor region of the first conductivity type that is selectively provided in the second semiconductor region and has a higher impurity concentration than the first semiconductor region;

a first electrode that is provided on a surface of a portion, which is interposed between the third semiconductor region and the first semiconductor region, in the second semiconductor region, with an insulating film interposed therebetween;

a second electrode that comes into contact with the third semiconductor region and the second semiconductor region;